LAHOMA AGRICULTURAL EXPERIMENT STATION

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The Spring Grain Aphis

During the winter and spring of 1907, Oklahoma suffered om a severe attack of the Spring Grain Aphis (Toxoptera ramineum) upon the wheat and oat crops of almost the en- re state. When this insect first made its appearance it was signated as the "Green Bug" on account of its color and is name has come into general usage.

The past history of this insect is meager and only in re- nt years have definite records of its ravages been kept. In 90 and again in 1901 this pest did notable damage to the ts and wheat in the Southwest. Nothing was known of it tween these dates but we can feel certain that a small num- r of individuals were present at all times, and needed but e proper climatic conditions to bring them into prominence.

Devastations from this pest may be expected to occur ly during those years when the weather conditions are eal for their rapid development and dissemination. An open inter, followed by a cold, wet, backward spring, gives them e opportunity they desire and they are not slow in taking dvantage of it. Ordinarily the "green bug" is held in check rgely by other insects such as the lady bugs and parasitic ies or bees that prey upon them. During such a season as e one described above these predatory insects cannot mul- ply rapidly because this weather is altogether unfavorable r their development, retards their growth, prevents their gs from hatching, and interferes with their activity.

An open winter with weather uniformily mild will permit phids of all kinds to multiply unhindered since their natural emies are dormant at this time. A cold spring continues

these conditions until such crops as wheat and oats are destroyed. The years 1890, 1901, and 1907 were notable in that the winters were very mild and the springs backward. Small grain crops all over the south suffered more or less from this pest during these years. Had these springs been normal, no serious damage would have been done by the "green bug". During the spring of 1907 a short period of warm weather occurred in March and the "green bug" situation promised to be relieved before much damage had been done but the warm period was not long enough in duration to stop the ravages of the pest. Texas was relieved largely by the warm spell in March, but most of the small grain in that state was destroyed by that time. When warm weather did finally come and a temperature of over 55 degrees was maintained, the pest soon succumbed to its natural enemies.

THE HABITS OF THE INSECT

This insect belongs to the plant louse family. It does not devour the tissue of the host plant but derives its nourishment by sucking the juices of the plant. One insect would do but little damage, but thousands congregated upon the same plant soon sap it of its living elements.

This insect reproduces by giving birth to living young. This is a rare habit among insects; being found only in the louse family, and gives great possibilities in the way of rapid reproduction since all the individuals are females, or better known as stem-mothers. No sexual intercourse is required for fertilization and each stem-mother continues to give birth to other stem-mothers so long as conditions surrounding them are favorable for their development. With this power of multiplication and rapid development so great, one individual can soon be represented by an enormous number of offspring. Each stem-mother may give birth to ten or more individuals per day for a period of ten to twelve days. The young complete their growth and are themselves ready to reproduce in six to eight days so you may find three or four generations on the same leaf.

When cold weather appears in the fall sexes may be produced. Males and females perfectly developed may appear. The females will deposit small black eggs and die. These eggs will hatch stem-mothers and for another season no true sexed forms will appear. In our latitude the sexes may not be produced at all, the stem-mothers probably migrating to our fields from Texas in the late fall and early winter. Small colonies were to be found in most of the wheat fields in southern Oklahoma during January and February. Had sexes been produced and eggs deposited there would have been no winter damage. Insects were observed giving birth to young when the temperature was below freezing.

The production of winged forms has no relation to sex or activity other than migration. Nature has endowed these little insects with power to provide themselves with wings when occasion demands. Should the colony become too large for the food supply a per centage of the offspring will be winged and these winged individuals will migrate to new fields. The per cent of winged forms depends upon the fluctuation of the food supply.

DISTINCTIVE FEATURES OF THE "GREEN BUG."

All the plant lice are very much alike in appearance. Some varieties are slightly larger than others and some vary slightly in color but the general appearance and the habits are much the same. Each species has only a few host plants upon which it thrives and it is frequently safe to identify a species by the food upon which it is found. The similarity of spices has led farmers to pronounce all lice "green bugs," meaning the Spring Grain Aphis. This suspicion has extended over the present year and numerous letters are being received now enclosing samples of lice that are supposed to to be the same as the pest of last year. Up to date not a single case has proven to be the "green bug." Most of them are the common wheat aphis (Nectarophora cerealis) found in our wheat fields at all times and noticed now for the first. time. The farmers are on the lookout for the pest that caused

such destruction last year. There may be a few "green bugs" (Toxoptera Gramineum) in Oklahoma at present but they are few in numbers and the farmers need have no fears for their wheat crops or hesitate to sow oats on account of this pest.

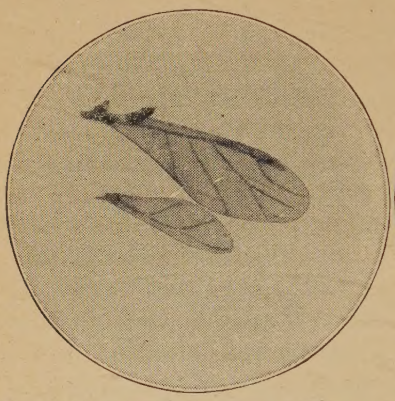

Fig. 1.—Wing of the Spring Grain Aphis or "green bug", showing characteristic veining.

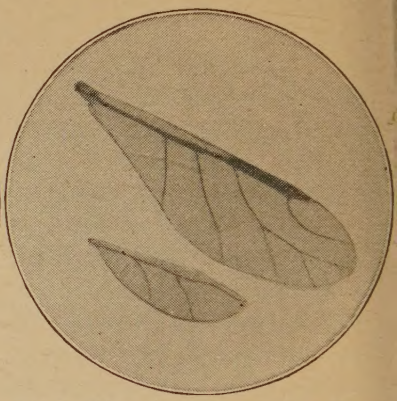

Fig 2.—Wing of the wheat plant louse, showing characteristic veining.

In order that the farmer may determine for himself whether or not he has the "green bugs" present in his field two cuts are here shown. The different species of the plant louse can be distinguished by the difference in the veins of the wings. Figure 1 shows the wing of a Spring Grain Aphid, or "green bug," with its characteristic veining. Figure 2 shows the characteristic veining of the wheat louse. By careful examination, these differences may be readily seen with the naked eye and the farmers can tell to what class the lice found on his crops belong. Of course, there are other forms but the two given are the common ones. If the wing is not like Figure 1 then the species is as distinct from the Toxoptera as one breed of animals from another.

METHODS OF LESSENING LOSSES FROM LICE AND OTHER INSECTS.

Good farming is the best method known to lessen the ravages of insect pests. If the experience of last year taught the farmers anything at all, it was the value of the right

kind of farming. In every case where total destruction of all the fields did not occur, the land that had been well prepared and carefully seeded at the proper time showed the least damage to the crops as a result of the work of the pest. In many instances adjacent fields were seen, one of them entirely destroyed and the other showing only slight damage, the only difference in the fields being the methods of farming used.

Various methods were used in an attempt to control the pest in the fields, but they all failed to do the work in a practical manner, and so far nothing has been found which will destroy the pest after it has become firmly established in the fields. Various sprays were tried with poor success and the fumigation of the spots with poisonous gases did not give satisfactory results. Heavy pasturing only hastened the destruction. Applications of lime were made in the hopes that its caustic properties would kill the lice but it did not. If every farmer had watched his fields carefully and had destroyed the insects when they first appeared in small spots by piling straw on them and burning, the devastation might have been averted but such a practice does not seem to be possible. The only thing for the farmer to do is to farm in such a way as to give his crop every opportunity to mature in spite of the insect pests. This can only be done by surrounding them with favorable growing conditions at all times. The lice were just as plentiful on the rank-growing wheat as on the other but its thrifty condition enabled it to grow, and even mature a fair crop, where the poorly cared for crop was an utter failue. Rotation, barn-yard manure, legumes, and early, deep plowing together with good seed will go farther toward combating successfully the insect enemies that prey upon our crops than all the other things that can be used against them.

NATURAL ENEMIES

A word as to the parasitic enemies of the "green bug" will not be amiss here. This pest was not destroyed last year

through any efforts put forth by man, or by the approach of warm weather. Their eradication was brought about by the parasites, or natural enemies of the pest, that made them a source of food supply. Nature has so arranged things that some insects must earn a livlihood by preying upon others, and in this case a number of these parasites were to be found in the wheat fields preying upon the "green bug". The most common parasite and the one that did most toward stamping out the pest was a small wasp-like insect which deposited its eggs in the bodies of the lice. These eggs hatched out into tiny grubs which fed upon the juices of the bodies of the "green bugs" and finally kill them. When mature these little insects escape through a hole in the "green bug's" back and during the warm season thousands of the dead lice could be found on the leaves of the wheat, each one having the characteristic hole in the back. These bees could not work to advantage when the temperature was below 55 degrees and hence their value was not recognized until late in the spring. The length of time required for the parasite to complete its life history is only a few days in warm weather and each insect is capable of laying a large number of eggs. This power of multiplication soon gives them the advantage of their enemies and they are enabled to destroy a large per cent of them.

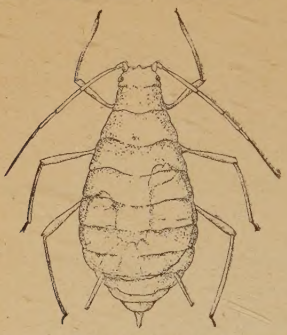

Fig. 3.—Wingless female of "green bug", containing larva of parasitic wasp much enlarged. (Cir. 93, Bur. of Ent.)

Fig. 4—Dead green bug showing hole from which the mature parasite Hysiphlebus tritici emerges. The top figure shows the lid still attached but pushed back. The lower figure shows the parasite emerging. Enlarged. (Cir. 93, Bur. of Ent.)

The "lady bug" is another insect that was quite efficient in destroying the lice but its powers of multiplication are not so great and in the face of the great epidemic, its influence is not felt to any extent. In ordinary years they play an important part in holding the lice in check. In the laboratory a lady bug larva was observed to eat 192 lice in 24 hours. This number is considered unusually large. These beneficial insects should be encouraged in every possible way for they feed altogether upon insects that are harmful to the agriculturist.

There are three reason for believing that the "green bug" will do no harm to the crops this year.

1. There are no "green bugs" present in the fields at present, at least we have been unable to discover any of them.

2. There is but little probability of the weather conditions being the same again this year as they were last.

3. The multiplication of parasites last season due to the unlimited food supply makes their number so great that the lice could not propagate fast enough to do serious damage between now and warm weather.

SUMMARY.

1. Good farming is the best bug destroyer known.

2. There are few, if any, "green bugs" in the wheat fields at present.

3. The pest cannot be checked by spraying, dragging, or other artificial methods.

4. The parasites may be depended upon to hold the lice in check in ordinary years. They do not have to be introduced into the fields where the lice are at work for they are found naturally in the fields in sufficient numbers to cope with the lice if the weather is warm enough for themto work.

W. L. ENGLISH.